AIR FORCE PLANT PJKS, SYSTEMS INTEGRATION LABORATORY, SIGNAL TRANSFER BUILDING
(Air Force Plant PJKS, Systems Integration Laboratory, Blockhouse Building T-28A)
Waterton Canyon Road and Colorado Highway 121
Lakewood Vicinity
Jefferson County
Colorado

HAER No. CO-88-C

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Rocky Mountain System Support Office
National Park Service
P.O. Box 25287
Denver, Colorado 80225-0287

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(Air Force Plant PJKS, Systems Integration Laboratory, Blockhouse Building, Building T-28A)

HAER No. CO-88-C

Location: Waterton Canyon Road and Colorado Highway 121, Lakewood Vicinity, Jefferson County, Colorado

Date of Construction: 1960-61

Fabricator: Kaiser Steel Corporation, Fabricating Division, Montebello, California

Present Owner: U.S. Air Force

Present Use: Houses controls for propellant transfer, instrumentation for testing, test data transmission receivers, data verification equipment, and centralized utilities for Titan missile propellant systems testing and evaluation

Significance: The Signal Transfer Building, more recently referred to as the Blockhouse Building, played a significant role in the development of the Titan II ICBM, which not only served as the largest and most destructive weapon in the U.S. nuclear arsenal during the Cold War (1962-87) but also functioned as a launch vehicle for the Gemini space program in 1965. The structure housed controls for propellant transfer, instrumentation for testing, test data transmission receivers, data verification equipment, and centralized utilities for the Systems Integration Laboratory for testing, handling, and storage of the Titan II's hydrazine- and nitrogen tetroxide-based fuel system propellants. Testing and evaluation procedures controlled from this building were critical to missile research and development and contributed to the success of the exceptionally significant Titan II program.

Historian: Harlan D. Unrau, National Park Service, Denver Service Center, 1999.

Description: Constructed in 1960-61 as part of the Systems Integration Laboratory complex, the reinforced concrete Signal Transfer Building (T-28A) was designed to house controls for propellant transfer, instrumentation for testing, test data transmission receivers, data verification equipment, and centralized utilities for the laboratory complex. Located on a bench approximately 500' east of the Cold Flow Laboratory (T-6) and immediately north-northeast of the Systems Integretion Leboratory Building (T-28), this single-story building is functionally linked to additional buildings in the laboratory complex.

The Signal Transfer Building rests on a reinforced concrete foundation. The interior walls are concrete block, and the floor is concrete slab. The 10-foot-high ceiling is

open, and the roof is a concrete slab covered with built-up tar and gravel. A single, sealed access door on the east side of the building permits access to the structure.

The concrete building (20'-0" x 40'-0") contains two rooms, each having dimensions of 20'-0" x 20'-0". The room on the west side of the building was originally designated as the signal transfer room, while that on the east side was the equipment room. A central single door permitted access between the two rooms. A small rest room (6' 8" x 7' 8"), containing one toilet, one lavatory, and one urinal, was located in the northwest corner of the equipment room.

The 10-foot ceiling height in the signal transfer room accommodated instrumentation racks that were approximately 7' in height, cable trays over the racks, and lighting fixtures. Minimum clearance between the top of the racks and the trays was approximately 1', and unobstructed clearance above the trays was approximately 1'-6". A 6" conduit for entry of data lines from Test Cells 6 and 7 and the Gas Generator Enclosure in the Systems Integration Laboratory Building (T-28) entered the signal transfer room at approximately 8' above floor level. Cable exits (land line carriers) from the building were located below ground level to afford protection to carriers from the harmful effects of propellants or vapors.

A steel-rib aluminum-sided lean-to (11'-0" x 25'-0") on the south side of the building, sometimes referred to as the mechanical room, houses the air conditioning system for Test Cells 6 and 7 in the adjacent laboratory building. The lean-to has a concrete floor and rests on a concrete slab foundation. It has a metal roof, and its ceiling is open with a shed-slope configuration. A valve station is located on the exterior of the south side of the signal transfer room immediately to the west of the lean-to.

The Signal Transfer Building has undergone little structural modification since its construction, and onsite examination found no evidence of significant structural alterations. However, use of this structure to support testing of later launch vehicle systems, such as the Titan III and Titan IV, has resulted in upgrades and modifications to its technological systems and instrumentation.

History: The Signal Transfer Building was constructed on Air Force property adjacent to the Martin Company's Denver Division plant during 1960-61. In May 1960, the Martin Company contracted with the Kaiser Steel Corporation, Fabricating Division, of Montebello, California, to prepare the design specifications for and construct the Signal Transfer Building as part of the Systems Integration Laboratory complex for Titan II propellant testing. The specifications and design drawings, based on design criteria developed by Martin Company Cold Flow Laboratory personnel, were prepared by ARCAL, Engineers-Constructors of Pasadena, California, under a subcontract from Kaiser Steel. Initial construction operations began in late June or early July 1960. Construction was completed by early March 1961.

The facilities in the Signal Transfer Building were first used on June 7, 1961, when the Martin Company started its captive test program for the Titan II with the firing of a

second-stage engine on nearby Test Stand D-1. Later on December 28, 1961, a Titan II missile underwent a complete captive-fired simulated flight in a static sequence test at the test facility.

The facilities in the Signal Transfer Building were utilized to control testing of Titan II propellant systems during 1961-64. Personnel stationed in this building initiated the captive firing tests, and they remained in this reinforced concrete structure during the tests for protection in case of explosion and against the dangers associated with chemical inhalation. Subsequently, the facility played a significant role in propellant system integration evaluations for the Titan III and Titan IV launch vehicles.

Sources: Sources include architectural drawings, blueprints, and site plans in the Engineering Propulsion Laboratory and Plant Engineering and Construction Department at Lockheed Martin Astronautics. The corporation's Photographic Laboratory, Reproduction Services Department maintains an extensive collection of black and white and color photographs depicting construction, equipment, and testing activities at the Signal Transfer Building. Typescript copies of the contract and specifications for the structure may be found in the Archives of the corporation's Engineering Propulsion Laboratory.

Printed and/or published materials relating to the design and utilization of the structure include: "Criteria For the Design of XSM 68B Cold Flow Systems Test Laboratory and Components Test Laboratory, The Martin Company, Denver Division, Denver, Colorado, April 15, 1960," Compiled by Cold Flow Laboratory Facilities Group (copy in Archives, Engineering Propulsion Laboratory, Lockheed Martin Astronautics); "Part II Valuations for Appraisal of Government-owned Test Area, Sections 20, 21, 28, 29, T6S, R69W, 6th P.M., Jefferson County, Colorado for Martin Marietta Corporation by Blaine B. Chase, MAI, SRA, and Wilson W. Wampler, July 1, 1971 (copy in Plant Engineering and Construction Department, Lockheed Martin Astronautics); and U.S. Department of the Air Force, Air Force Materiel Command, Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio and U.S. Department of the Army, Fort Worth District, Corps of Engineers, Fort Worth, Texas, Historic Building Inventory and Evaluation, Air Force Plant PJKS, Jefferson County, Colorado, prepared by EARTH TECH, Colton, California, and William Manley Consulting, San Diego, California, February 1997. Completion of the structure and its first utilization as part of the Titan II testing program are chronicled in "Main Area Profiles Change With Plant, Titan II Facilities," Martin Mercury 18 (10 March 1961): 2A, 2C; "First Titan II Propulsion System Test Firing at M-D," Martin Mercury 18 (16 June 1961): 2C; and "Titan II Passes Its First Captive Firing," M News 19 (12 January 1962): 1, 3.